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Zooming in: A Microanalysis of Couples' Dyadic Coping Conversations after Experimentally Induced Stress

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Abstract

Growing evidence that social support in times of stress is crucial for well-functioning relationships raises important questions about how intimate partners elicit specific forms of supportive behavior. To explore the process of support elicitation, we exposed either the male or female partner in a relationship to a standardized laboratory stressor (N = 127 couples), videotaped their subsequent reunion, and then coded those interactions at a microanalytic level to investigate links between expressions of stress and partner responses to those expressions. Multilevel analyses indicated that the type of stress expression served as a cue for the dyadic coping reaction of the partner. For example, problem-oriented stress expression within a 10s interval of the conversation was strongly linked to problem-oriented dyadic coping in the same or following time sequence, while emotion-oriented stress expressions were associated with emotion-oriented dyadic coping reactions. These findings enhance the understanding of the link between different stress expressions and dyadic coping reactions and offer important implications for couple interventions.

Keywords: within-couple processes, stress, dyadic coping, couple relationships, sensitivity

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Coping with stress together as a couple is important for the maintenance of a healthy and satisfying relationship (Bodenmann, Pihet, & Kayser, 2006; Falconier, Jackson, Hilpert, & Bodenmann, 2015; Pasch & Bradbury, 1998). To be able to provide the most effective support in stressful times, partners have to match their supportive behavior to the stressed person's needs. Effective support is most likely when the stressed partner expresses his or her stress in an appropriate, unambiguous way, thereby enabling the partner to correctly perceive these stress signals and respond to them in accordance to the speaker's needs (Bodenmann, 2007; Cutrona, 1996; Cutrona & Russell, 1990; Rafaeli & Gleason, 2009). The support should be appropriate not only in content but also in timing (Neff & Karney, 2005) if it is to be perceived as well-intentioned and useful (Bodenmann, 2005). As the literature on interpersonal sensitivity indicates, promptness is an important factor in the process of emotional regulation (e.g., Henning & Striano, 2011): whereas an immediate response to an expression of stress can indicate empathy and concern, the same response delivered after a delay can come across as abrupt or inappropriate and thus as failing to meet the stressed partner's needs (Bodenmann, 2005). Although diary studies successfully exploit repeated self-reports to clarify support provision in relationships (e.g., Laurenceau, Barrett, & Pietromonaco, 1998; Repetti, 1989), exchanges involving expressions of stress and responses to those expressions might be brief and fleeting, suggesting the need to study these processes directly as they unfold within real-time interactions. The present study does so, using a standardized stress-induction procedure to ensure that experiences of stress are relatively uniform across couples.

The Systemic Transactional Model (STM; Bodenmann, 1995, 2005) offers an important perspective for studying stress communication and support in relationships. The

STM posits that adequate communication of stress, and the response of the partner, are important for the stress regulation process on an individual and dyadic level, fostering in turn well-being for the partners individually and satisfaction for the couple. According to the STM, the supportive partner must perceive and decode the stressed partner's signs of stress, which is facilitated by a clear stress expression. For example, when feeling sad after an unjustified criticism by a colleague at work, one might better be able to deal with these emotions if one's spouse shows emotional understanding and support rather than giving practical advice. However, empathic understanding of this sort is more likely when the stressed partner talks about his or her feelings and tells the other what bothers him or her. Talking merely about facts with no stress-related self-disclosure is often followed by problem-oriented support of the partner (Bodenmann, 2000). Sensitive responses to the partner's stress signals and needs are believed to be critical for higher intimacy and mutual bonding (Bodenmann, 2005; Laurenceau at al., 1998; Reis & Shaver, 1988).

Stress and Dyadic Coping in the Systemic Transactional Model

The STM describes a transactional process of stress expression and support provision or joint dyadic coping (DC) processes involving both partners in an intimate relationship. DC has consistently been identified as a significant predictor of marital satisfaction and stability (e.g., Bodenmann, Pihet & Kayser, 2006; Falconier et al., 2015).

Stress Expression

In the STM (Bodenmann, 1995, 2000; Bodenmann & Perrez, 1991), stress can be expressed verbally or nonverbally, and those expressions can be problem- or emotion-oriented. Problem-oriented stress expression is often expressed verbally, such as asking one's partner for practical advice or tangible assistance, whereas emotion-focused stress may be communicated verbally or nonverbally, reflecting one's emotional state. The latter is not necessarily intentional. For example, one partner can express his or her emotional stress

without aiming to mobilize the other partner's engagement in DC, while this is more often the case in problem-oriented stress expression where the help of the partner is required. Often, emotional expression of stress is a manner of telling the partner about personal worries, negative experiences, and embarrassment with no clear purpose of support seeking. Nonverbal stress communication includes voice tone, sighs, or facial expressions (Bodenmann, 2005). Emotion-oriented stress-related self-disclosure includes implicit or explicit expressions of one's mood, emotions, and bothersome cognitions or an explicit request for assistance. Implicit stress expression can take the form of talking about the stressful situation by addressing a vague unpleasant experience, but without talking about concrete feelings (e.g., "I had a bad day"). Explicit stress expression is characterized by talking about concrete emotions (e.g., "I have never been that embarrassed"; "I feared that I would not be able to do this well"; "I was sad that this happened"), or an explicit request for support by the partner ("I feel so sad about that, I need you now").

Dyadic Coping

The partner may or may not perceive and react to these stress expressions. DC reactions can be verbal or nonverbal, positive or negative, and they can focus on problem-solving or emotion regulation in order to support the stressed partner or to cope together with stress. *Problem-oriented supportive DC* is defined as helping to resolve practical components of a stressor, giving advice, suggesting solutions, or taking over tasks in order to alleviate stress for the partner. *Emotion-oriented supportive DC* includes empathic understanding, active and interested listening, caring, reassurance or encouragement as well as showing solidarity with the partner. It also includes reassuring nonverbal behaviors such as touching the partner (e.g., hugging, holding, kissing, giving a massage). DC can also be *negative* when partners react in a hostile (e.g., blaming the partner for his or her stress management), ambivalent (e.g., unwillingness to support him or her), or superficial way (e.g., lack of real

motivation to support). These negative forms of DC occur, for example, when the listening partner is not motivated or committed (e.g., low relationship satisfaction) or has poor personal resources (e.g., being stressed him-/herself, lack of an adequate DC skills).

Linking Stress Expression with Dyadic Coping

In principle, stress-related self-disclosures facilitate a deeper and better understanding by the partner, allowing him or her to provide adequate support that corresponds to the needs of the stressed partner (Bodenmann, 2005; Cutrona & Russell, 1990). According to the Optimal Matching Model (Cutrona & Russell, 1990) and the Social Support Effectiveness Model (Rini & Dunkel-Schetter, 2010), provided support is most beneficial when it matches the partners' needs (Cohen & Wills, 1985; Cutrona, Shaffer, Wesner, & Gardner, 2007). Along similar lines, the STM assumes that a more explicit stress expression enables the partner to gain a deeper understanding of the emotions and needs of the stressed partner, and that this empathic understanding subsequently allows partners to feel connected and to strengthen their sense of mutual trust and intimacy (Bodenmann, 2005; Cutrona, 1996). This reasoning is in line with the intimacy process model (Reis & Shaver, 1988) which states that self-disclosure leads to more intimacy when the other partner is able to convey a feeling of understanding, validating, and caring for the stressed partner (see also Laurenceau et al., 1998). In short, adequate support in intimate relationships requires an appropriate stress communication that might be particularly important for emotional stress experiences.

Gender Differences

Past research suggests that stress expression differs between genders (e.g., Bodenmann et al., 2015; Dindia & Allen, 1992), whereas gender differences in support reactions are less consistently reported (e.g., Bodenmann et al., 2015; Donato et al., 2015). Research has reported similar effects for the amount and type of social support for men and women (Roberts & Greenberg, 2002; Sullivan, Pasch, Johnson, & Bradbury, 2010), however, men

and women differ in support provision when they are stressed themselves, with stressed men being less able to provide adequate support (Bodenmann et al., 2015). Studies on matching and the adjustment over time have shown that women tend to be more likely to respond with emotional support to emotional self-disclosures than men (Cutrona et al., 2007; Neff & Karney, 2005). As noted below, we aim to build on this finding in the present study.

Current Study

In the current study, we focus on the within-couple associations between one partner's stress expression and the other partner's DC to examine whether partners alter their DC reaction according to the form of their partner's stress expression. For the analysis, we used data from an experimental study with a non-clinical sample of satisfied couples in which either the woman (experimental condition 1) or the man (experimental condition 2) was stressed by means of the Trier Social Stress Test (TSST; Kirschbaum, Pirke, & Hellhammer, 1993). Couples' interactions were videotaped during the reunion with their partner after the stress induction and were subsequently micro-analytically coded. Using observational data overcomes possible response biases associated with self-report data, and approaching these observed conversations at a micro-analytic level overcomes limitations associated with aggregating data either over partners or across relatively long spans of time. We adopted this level of analysis under the assumption that fluctuations and micro-processes could give valuable insights into underlying mechanisms of support, and with the reasoning that investigating behavioral sequences rather than base rates can yield information about the underlying processes that govern interactions involving stressed partners (see e.g., Johnson & Bradbury, 1999).

We hypothesize that the stressed partner's type of stress expression (problem- vs. emotion-oriented) should pave the way for a corresponding, time-contingent DC reaction on the within-couple level as suggested by the STM. For example, problem-oriented stress

expression might serve as a stronger cue than emotion-oriented stress expressions for the partner to respond with problem-oriented DC (and vice versa). Hence, partners' DC is assumed to be continually adjusted to the corresponding stress expression. At the same time, partners' DC responses can also be maladaptive (i.e., negative DC), either due to depleted coping resources, a lack of motivation or skills to support the partner effectively, or because the stress expression was ambiguous. To control for the general level of stress expression, we also investigate parallel effects on the between-couple level, attempting to replicate previous findings (e.g. Cutrona et al., 2007). Based on previous research reporting gender differences in adjusting support provision, we expected women to react more strongly, i.e., with a higher likelihood, to emotion-oriented stress expressions than men would.

Method

Participants

The sample consisted of 127 heterosexual couples who were recruited by advertisements in newspapers, magazines, and internet sites. All couples had to meet the following inclusion criteria: (a) willingness of both partners to participate, (b) stable and committed heterosexual relationship for at least 12 months, and (c) both partners aged between 20 and 45 years. Additionally, both partners had to communicate in German for the purposes of observational coding. Exclusion criteria for participation were chronic mental or physical illness, medication, and prior participation in the TSST (Schommer, Hellhammer, & Kirschbaum, 2003).

Average age for women was 26.0 years (*SD* = 5.5) and for men 28.2 years (*SD* = 6.2). Most participants (57% of the women and 47% of the men) were in continuous education, mostly at university. Average relationship length was 4.5 years (range 1 – 19 years, *SD* = 3.6). Half of the couples were cohabitating, and 18% were married. Most of the couples had no children (87%). On a 5-point index of relationship quality (Hendrick, 1988), participants'

average score was 4.4 (*SD* = 0.4), which indicates high relationship satisfaction. Couples in the two conditions did not differ with regard to all demographic characteristics ($F \leq 1.601$, $p \geq .208$).

Procedure

Extra-dyadic stress was induced by using the Trier Social Stress Test (Kirschbaum et al., 1993), a widely used standardized and well established stress procedure (for an overview, see Dickerson & Kemeny, 2004). Sessions took about 2.5 hours. In 64 couples the woman was randomly chosen to be stressed and in 63 couples the man was randomly chosen to be stressed. Participants were informed about the study procedure but did not know in advance which of the partners would receive the TSST. After a brief introduction of the study, both partners signed an informed consent before they completed a first set of questionnaires. Before and after the stress induction, couples were left alone in a separate room for 8 minutes while their conversation was videotaped. The room was equipped with a couch and small table with an informal, comfortable setting to allow for a free, unstructured interaction between the partners. Couples were asked to remain seated and did not receive further instructions. While the TSST was conducted in a separate room, the partner waited in the observation room.

Following the standard protocol, the TSST involved a free speech (4 min) and mental arithmetic (4 min) task. Participants were given 5 min to prepare for a mock job interview. They were told that they would have to present themselves in front of an evaluative audience with expertise in analyzing nonverbal behavior. In addition, a video camera was directly pointing to the participant. The audience was instructed to maintain neutral facial expressions and to provide only brief, neutral, and distant reactions. Participants had to talk about their strengths and qualification for the job and were asked questions such as “Why do you think you should get this job?”. For the subsequent 4-min oral arithmetic task, participants serially

subtracted 17 from 2,043 as quickly as possible. After any mistake, they were interrupted and asked to start again from the beginning. Couples reunited after the TSST and were asked again to remain seated and wait "while investigators checked whether all data were properly recorded and can be used for analyses", so that the second 8-min interaction could be videotaped. The second interaction was thus similar to the first one but differed that partners (depending on group) had been stressed. Again, partners were not specifically instructed what they should talk about. Finally, couples received a debriefing and were given an incentive of $100. The study procedures were approved by University of Zurich Institutional Review Board.

Measures

Observed stress expression and dyadic coping.

We used a well-established coding system (SEDC; System for assessing observed dyadic coping; Bodenmann, 2000) to code five forms of stress expression and four forms of verbal DC in the interactions occurring before and after the TSST. For the purpose of the current study, only the data of the second interaction phase that took place after the stress induction for one of the partners were analyzed. A manipulation check comparing the two conversations before and after the stress induction revealed significant increases in stress expression of the stressed partner and DC of the non-stressed partner for the two experimental groups.

Stress expression of the stressed partner.

Stress expression was coded using five categories: *verbal problem-oriented stress expression* (e.g., asking the partner for advice or specific assistance), *nonverbal stress expression* (e.g., sighing, restlessness, whiny voice), *neutral stress expression* (neutral or factual descriptions of what happened during the TSST), and verbal emotional self-disclosures including *implicit stress expression* (e.g. superficial feelings such as "stressed" or "frustrated" or self-scrutinizing) and *explicit stress expression*

("I have never been that embarrassed" or "I was really hurt by that person's behavior"). Because base rates for explicit stress expression were extremely low (0.2% - 14 out of 6096 sequences), implicit and explicit stress expressions were collapsed into one category (verbal emotion-oriented stress expression).

Dyadic coping of the non-stressed partner. We assessed DC including *problem-oriented DC* (giving advice, assistance), *emotion-oriented DC* (validating partner, helping to re-evaluate the situation, or showing understanding and respect, as well as nonverbal behavior such as supportively touching or kissing the partner) and *negative DC* that included all support behaviors that were hostile, ambivalent, dismissive, or superficial.

Stress expression and DC behaviors were coded at 10-s intervals by independent, thoroughly trained coders, blind to study hypotheses. For each couple, one observer coded the woman's behavior, and the other observer simultaneously coded the man's behavior. Coders were instructed to code for the presence (= 1) versus absence (= 0) of these behaviors. Ten percent of the tapes were re-coded by independent observers, and interrater-reliability was Cohen's κ=.78 for stress expression and .87 for DC reactions. Conversations lasted 8 minutes so that the resulting dataset contained 48 sequences with a dummy-coded 10s interval each.

Statistical Analyses

The goal of this study was to examine the stress-coping process on a micro-analytic level during a couple conversation. We conducted series of multilevel models to investigate how stress expression and DC are linked during every sequence of the conversation but also how couples may differ in general in their DC reaction following certain stress expressions. We thus differentiate between a within-couple (Level 1) and a between-couple level (Level 2).

We estimated three multilevel models for the different forms of verbally active DC (problem-oriented DC, emotion-oriented DC, and negative DC) as outcomes. Multilevel analyses calculate the association between predictor and outcome within each sequence. As coping reactions might occur delayed (lagged) to a stress expression considering the short sequence interval of only 10 seconds, we accounted for this lag effect by creating an outcome variable that combined the DC reaction and - at the same time - accounts for the DC reaction that occurs one sequence later. We first created a 1-lag variable of the DC reaction and combined it with the non-lagged dummy coded DC variable so that if a coping reaction occurred in the 10s sequence after the sequence in which the stress expression had occurred, the combined variable would now indicate a coping reaction (coded as 1) in the same sequence.

Within- and between-couple variables. Following recommendations of Bolger and Laurenceau (2013), we decomposed effects for the different stress expressions into two separate predictors reflecting within- and between-couple variation. As within-couple predictors, the dummy scores were used. We did not center these dummy scores to ease interpretation. To correct for the overall level of each stress expression, the centered mean scores of every stress expression per couple were used as between-couple predictors. First, we calculated the mean score per person and then subtracted the overall mean to center the variable. Hence, on the within-couple level, for every stress expression during a certain 10s sequence where the behavior (coded as 1) occurs, we investigate the effect of the coping reaction from the partner during the same 10s sequence (using the combined non-lagged and lagged outcome variable).

We used the following baseline equation:

$$Coping_{it} = \beta_{0i} + \beta_1(\text{gender}) + \beta_2(\text{sequence}) + \beta_3(\text{problem-oriented stress expression}_{within}) + \beta_4(\text{nonverbal stress expression}_{within}) + \beta_5(\text{neutral stress expression}_{within}) + \beta_6(\text{emotion-}$$

oriented stress expression$_{within}$) +β_7(problem-oriented stress expression$_{between}$) + β_8(nonverbal stress expression$_{between}$) + β_9 (neutral stress expression$_{between}$) + β_{10}(emotion-oriented stress expression$_{between}$) + u_{0i}+ r_{it}

Coping$_{it}$ is the predicted outcome (e.g., problem-oriented DC) for subject i on time sequence t; β_{0i} represents the overall intercept at the beginning of the conversation, β_1 represents the main effect for gender of the partner providing dyadic coping behavior; β_2 represents the main effect for the time sequence; $\beta_{3\text{-}6}$ indicate the difference in dyadic coping per time sequence given the stress expression was present in comparison to when it was not present; $\beta_{7\text{-}10}$ reflect the average difference between couples in DC for a 1-unit increase in each of the four stress expressions; u_{0i} is the random effect of the intercept specific to subject i representing the variation between subjects in average DC, and r_{it} is the residual specific to time t for subject i.

To examine whether gender moderated the effects, in addition to the main effects, we also included interaction terms of stress expression and gender (stress expression*gender) on the within- and between-couple level. Model comparisons revealed that including the interaction terms did not improve model fit compared to the main effects only model (see Singer & Willett, 2003). Hence we only report the results of those final models[1]. Gender was dummy coded (0 = women, 1 = men) such that the intercept reflected the female DC behavior when the male partner was stressed. Time was coded such that the intercept reflects the start of the conversation and a 1 unit increase represents one 10 second sequence.

Results

[1] We conducted additional analyses with contextual variables such as relationship length, cohabitation and current and chronic stress of the supporting partner as moderating variables. A comparison of the model fit indices of the moderation models with the models reported in the article favored the more parsimonious models.

Preliminary Analysis

Our sample includes 64 stressed women and 63 stressed men, both taking part in an 8-min conversation (48 sequences) with their partner. In total, we thus have 6096 observations (64 women stressed x 48 sequences = 3072 observations, and 63 men stressed x 48 sequences = 3024 observations). Table 1 presents the means and standard deviations of the mean amount of stress expression and DC behaviors that were observed during the 48 sequences of the conversations for the two conditions. Neutral stress expression, for example, occurred in about 16.14 - 20.42 of the 48 sequences for men and women, respectively. For most of the stress expressions, there were significant differences between men and women. Stressed women showed significantly more problem-oriented, neutral and emotion-oriented stress expressions than stressed men. Men provided more emotion-oriented DC and more negative DC. The intra-class correlations (ICC) was .47 on average (problem-oriented DC: .36, .44; emotion-oriented DC: .22, .29; negative DC: .61, .87 for men's and women's DC, respectively), which implies that most of the variance was within rather than between individuals. Negative DC seems to have more consistency within couples.

Figure 1 depicts the plots showing the four different response patterns for the stress expressions and DC reactions for men and women separately. When problem-oriented stress expressions are coded, problem-oriented DC is coded more often than emotion-oriented and negative DC. In only eight instances of all observations, negative or emotion-oriented DC was coded in the same sequence as problem-oriented stress expression. For non-verbal stress expressions, emotion-oriented DC seems to occur more often than the other DC reactions. The plots of the neutral stress expressions generally show that DC reactions are being coded indistinctively whether neutral expressions were coded as well or not. Emotion-oriented stress expressions are similarly, though less clearly, linked with emotion-oriented DC as are problem-oriented stress expressions with problem-oriented DC. In sum, the results of the

descriptive statistics suggest that even though men and women differ in how often they express stress or engage in specific forms of DC, response patterns are similar for both genders.

Below we present results separately for each form of DC using the combined variable including the DC reaction 10s later with the four different stress expressions as predictors[2] on the within- and between-couple level. We compared random intercept models with models that included a random intercept and a random slope with model fit indices of chi-square tests (see Singer & Willet, 2003). For all the three models, random intercept models fit the data best. There were no significant time trends over the sequences of the conversation in any of the models.

Problem-oriented dyadic coping

Table 2 shows the results of the generalized linear mixed model for problem-oriented DC as a function of the four different stress expressions of the partner. On the within-couple level, all four stress expressions were significantly associated with problem-oriented DC. In comparison to the other stress expressions, problem-oriented stress expression shows much stronger associations with problem-oriented DC. The substantial difference in the odds ratio (OR) shows that the probability for concurrent and lagged problem-oriented DC was almost 120 times greater when problem-oriented stress expression was observed during the sequence compared to when the partner did not express problem-oriented stress. On the between-couple level, higher problem-oriented and neutral stress expressions were related to more problem-oriented DC. Similar to the within-couple level, problem-oriented stress expression shows

[2] We additionally ran models without explicit stress expression, only including implicit stress expression. The only difference in significance was observed for the model with emotion-oriented coping where the between-person implicit stress expression was significant (β = 3.41, p = .044).

very strong associations with the outcome. Thus, partners expressing higher problem-oriented stress throughout the entire conversation than the average of our sample received more problem-oriented DC from their supporting partners.

Emotion-oriented dyadic coping

Table 3 shows the results for concurrent and lagged emotion-oriented DC as the outcome. On the within-couple level, higher nonverbal, neutral and emotion-oriented stress expressions per sequence were related to more emotion-oriented DC. Only problem-oriented stress expression was not significant. This indicates that during sequences with any of these three stress expressions, compared to no or problem-oriented stress expression, the likelihood of receiving emotion-oriented DC increased significantly. On the between-couple level, results revealed that partners who used neutral stress expressions above the sample average throughout the conversation had higher likelihoods of receiving emotion-oriented DC. Emotion-oriented stress expressions were only marginally significant.

Negative dyadic coping

Table 4 shows that on the within couple level, the likelihood of a negative DC response in a sequence where there was a nonverbal stress expression was 4.39 times higher compared to when there was no nonverbal stress expression. Neutral and emotion-oriented stress expressions elicited negative DC to a similar extent. Interestingly, problem-oriented stress expression was not associated with significantly higher negative DC. On the between-couple level, none of the stress expressions proved to be significant predictors for negative DC. This means that, on average, participants, whose partners expressed more (or less) stress throughout the entire conversation (irrespective of the kind of stress expression) did not provide more (or less) negative DC.

Discussion

The goal of the current article was to examine the theoretical assumptions of the Systemic Transactional Model (STM; Bodenmann, 1995, 2005) by using observational data of stress communication and dyadic coping (DC) on a micro-analytical level. The STM posits that perception and decoding of stress signals are crucial for an adequate DC reaction, which implies that the stress expression should be clear and non-ambiguous. We thus investigated the association between different forms of stress expression and DC reactions of the partner on a within- and between-level. Results generally confirmed our hypotheses that partners adjust their supportive behavior according to the form of stress communication displayed by their partner during the videotaped discussions.

More specifically, problem-oriented DC was strongly associated with problem-oriented stress expression. As also seen in previous studies, it seemed easier for couples to react with practical support after factual, problem-oriented stress expressions than to emotion-oriented stress expressions (Bodenmann, 2000; Cutrona et al., 2007). Thus, partners expressing problem-oriented stress in one sequence (within-couple), as well as partners who were generally higher than the average (between-couple), had a higher likelihood of receiving problem-oriented DC than partners expression emotion-oriented stress. This may have two reasons. First, problem-oriented stress expression is easier to perceive and decode, whereas emotion-oriented stress expression is often more ambiguous and harder to interpret correctly (Bodenmann, 2005). Second, problem-oriented DC might be easier to provide as it usually includes practical tasks or advice. Emotion-oriented DC, on the other hand, is more demanding, and depends more on both partners' moods and resources, such as the current emotional availability. Partners might be less skilled in emotional support provision, out of

fear that they may react inadequately or because they do not know what exactly would be beneficial for the partner to help him or her regulate his or her emotions.

On the other hand, emotion-oriented DC was not associated with problem-oriented stress expression, indicating that partners are able to distinguish between both forms of stress expression and the required DC action. Emotion-oriented DC was observed after nonverbal, neutral, and emotion-oriented stress expression on the within-couple level. Couples also had a higher likelihood of showing emotion-oriented DC when the mean level of neutral stress expression was higher. For emotion-oriented stress expression, the association was marginally significant. Interestingly, partners seem to react similarly to rather ambiguous signals (nonverbal and neutral stress expressions) than to emotion-oriented stress expressions. Couples might be generally accustomed to less explicit stress signals in daily life, or the listening partner's mere knowledge that the other partner had been stressed by the experiment motivates him or her to provide emotional support. Emotion-oriented stress expressions, however, had a higher likelihood of eliciting emotion-oriented DC than the other types of stress expression, which is in line with predictions of STM.

The likelihood of negative DC was higher in relation to nonverbal, neutral and emotion-oriented stress expression compared to no or problem-oriented stress expression. Usually, one would expect a positively supportive partner when talking more emotionally about experienced emotions. For partners who have lower levels of trust and reciprocal respect, however, showing vulnerability might trigger negative DC (see also Cutrona et al., 2007). The non-stressed partner might also not have fully understood what the stressed partner had experienced, and why this was so important and stressful as it was only a non-relevant experimental stress situation with no further meaning for the partner or the couple's life. As a consequence, the partner's DC might have been less empathic and more ambivalent

or superficial. This may be different in real life, when the reported stress seems to have a more relevant impact.

In addition, implicit emotion-oriented expressions act less as a clear clue of how to provide support compared to factual problem descriptions. Sending cues such as sighing (nonverbal stress expression), explaining what happened during the stressful experience (neutral stress expression) or stating that one is stressed (implicit stress expression) might show substantial overlap with indirect support seeking (e.g., Barbee & Cunningham, 1995; Don, Mickelson, & Barbee, 2013). Research hints at the possibility that indirect support seeking, including nonverbal stress communication, can backfire and provoke negative responses (Barbee & Cunningham, 1995), which could explain the positive associations between nonverbal, neutral as well as the mainly implicit emotion-oriented stress expression and the partner's negative DC. However, the pseudo-R^2 for negative DC is much lower than for problem- and emotion-oriented DC, which might indicate that negative DC could be influenced by many other factors (e.g. low relationship satisfaction, lack of motivation) than only the partner's stress expression during the conversation.

Although we did not find gender differences for the associations between the different types of stress expression and DC reactions, women generally had higher mean levels of stress expression, which is in line with findings from a meta-analysis by Dindia and Allen (1992). One possible explanation might be a heightened math anxiety in women (Maloney, Waechter, Risko, & Fugelsang, 2012). Kelly and colleagues (2008) found that women reported more fear, irritability, confusion and less happiness following the TSST than men do. The differential effects of the TSST might explain the finding of men providing more emotion-oriented DC. Together with the knowledge that their partner had just been stressed, men might have been encouraged to engage in more DC efforts.

Because we are analyzing DC reactions during the same sequence or in the subsequent sequence 10s later, our focus lies on the time-contingent link between stress expression and DC. Time contingency is considered as one factor that plays a role for adequate support. Collins, Ford, Guichard, Kane, and Feeney (2010) differentiate between the manner in which support is provided and the degree of time contingency with the partner's needs, such as responding promptly. Neff and Karney (2005) likewise suggest that it is not only sufficient knowing how to provide support, but also when and "how to continually adjust their support provision in response to a partner's changing difficulties" (p. 80). However, partners might not always be able to provide a prompt, adequate coping reaction but first need to reflect on what they have just heard as new information. Therefore, sometimes we might observe a DC reaction, but it refers to a stress expression that had happened already some sequences ago. In addition, phases of stress expression might go on for several sequences. Future research should disentangle these timing processes in more detail.

Limitations and Future Directions

Our analysis is thus limited by the time-based 10s-coding. Event-based analyses might portray a clearer picture, particularly when it comes to contingent partner reactions and the duration of the different behaviors. Our analyses are more conservative because they only account for a DC reaction at the same or subsequent sequence. Second, assumptions about causality should be made with caution. Even though we included one 10s lag in the outcome variable, we cannot exclude the possibility that, for example, emotion-oriented DC also leads to more emotional stress expressions insofar as the stressed partner may be encouraged by the supportive partner to continue his or her stress-related emotional self-disclosure. Third, because the conversation covered a time period of 8 minutes only, results might not be generalized to other couple contexts such as coping situations that unfold over a longer period of time or ultimately result in intra-dyadic conflict, which may limit the external validity of

the findings. The TSST might thus not be able to represent all types of DC conversations. In daily life, couples may deal with different types of stressors including stressors that more directly affect both partners or spill over into the relationship. In such instances, the association between stress expression and DC might be different than in our analyses. Furthermore, partners in everyday life often face stressors at the same time, limiting their capacity to provide adequate support. For example, men's support quality decreased when they were stressed at the same time (Bodenmann et al., 2015). In addition, the laboratory stressor (including a mock interview and arithmetic tasks) might be different from stressful situations experienced in daily life with higher impact and greater significance. However, the different types of stress expression and DC reactions are most probably observed in real life as well (for a diary study see Xu, Hilpert, Nussbeck, & Bodenmann, 2016). Thus, although the stressor might be different for couples, the association between stress expression and DC might be similar. Lastly, generalizability might also be constricted to fairly satisfied, heterosexual Caucasian couples as those in our sample displayed high relationship satisfaction.

Despite these limitations, the study offers methodological strengths such as an experimental design with observational data and statistical analyses that go beyond the traditional static perspective in the stress and coping literature. By using a micro-analytic approach, we were able to detect variations that cannot be investigated with traditional designs that use aggregated indicators. In addition, the differentiation between the different forms of stress expression and DC behavior provides a more detailed picture than does the often used more simplified distinction between problem- and emotion-oriented behaviors and allows us to explicitly test the assumptions of the STM in more detail.

Clinical implications

Our findings might also be clinically relevant. As research suggests, emotional understanding seems to be crucial for adequate support processes (Bodenmann & Randall, 2012). If partners open up and disclose about their emotions, they are more likely to receive empathic understanding and reassurance from their partners. Stress-related emotional self-disclosure has the potential to increase intimacy and ultimately relationship satisfaction (Laurenceau et al., 1998). Although we find evidence for partners adjusting their support and matching it to the stress expression, people might not be very good at expressing their stress in a form that would enable the partner to provide the most suitable DC. Conversations often fail and end in withdrawal or conflict because of misunderstandings that are due to different ways of communication. Therefore, it would be important to teach couples how to provide adequate support and how to express their stress in a way that is less ambiguous and points more towards the actual needs of the stressed person. Such an approach is used in the 3-phase method within the Couples Coping Enhancement Training (CCET; Bodenmann & Shantinath, 2004) or coping-oriented couple therapy (Bodenmann & Randall, 2012). In addition to providing feedback on the DC reaction of the partner (third phase of the 3-phase-method), couples should be trained in providing feedback on their stress expression in order to learn from each other how to communicate more clearly about stress-related emotions.

Clearer stress expressions enabling the partner to decode which behavior would be the most helpful might also counteract under- or overprovision of support (see Brock & Lawrence, 2009). Roberts and Levenson (2001) provide the example of an over-engaged partner that directly engages in problem-solving or encouragement when the stressed partner might simply need some time to relax. They describe this situation as a “cycle of well-meant, but misguided, support” even though it might match the stress expression. All these issues could be addressed in couple interventions. However, future studies should also include

distressed couples or couples with mental disorders (e.g., depression, anxiety disorder) in order to detect differences on the micro-analytical level of the stress and DC process.

Conclusion

This study provides initial insights into the dynamics of support provision during conversations in which one partner is known to be stressed. Results provide empirical support for the STM on a micro-analytic level, showing that partners adjust their coping throughout the conversation. One key applied implication of this work is that intimate partners might benefit not only from learning how to provide support that is more responsive to one another's needs, but also from learning how to express their stress in ways that are less ambiguous and more likely to elicit the support they need.

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Table 1

Means, T-Test, and Intercorrelations for the Within- and Between Variables of the different Types of Stress Expression and Dyadic Coping

	Within-Couple (N = 6096 in total)						
Stress Expression	1	2	3	4	5	6	7
Problem-oriented (1)	-	-.019	-.099**	-.034	.371**	-.026	.003
Nonverbal (2)	-.009	-	-.141**	-.049**	.002	.042*	.078**
Neutral (3)	-.052	-.085	-	-.256**	.006	.169**	.081**
Emotion-oriented (4)	-.017	-.028	-.168**	-	.036*	.131**	.067**
Dyadic Coping							
Problem-oriented (5)	.277**	.088**	.082**	.008	-	-.013	-.040*
Emotion-oriented (6)	-.007	.079**	.183**	.127**	-.019	-	-.058**
Negative (7)	.012	.039*	.100**	.071**	-.034	-.021	-
	Between-Couple (N = 64 women stressed, 63 men stressed)						
Stress Expression	1	2	3	4	5	6	7
Problem-oriented (1)	-	.194**	.157**	.070**	.712**	-.009	.068**
Nonverbal (2)	.411**	-	.011	.343**	.107**	.145**	.444**
Neutral (3)	.272**	.304**	-	.121**	.298**	.405**	-.015
Emotion-oriented (4)	.058**	.180**	.381**	-	.121**	.446**	.258**
Dyadic Coping							
Problem-oriented (5)	.665**	.401**	.525**	.270**	-	.263**	-.019
Emotion-oriented (6)	.052**	.284**	.512**	.347**	.182**	-	-.231**
Negative (7)	.111**	.307**	.056**	.231**	.186**	-.116**	-

	Women's stress conversation	Men's stress conversation	
Stress Expression	*M (SD)*	*M (SD)*	*t (df* =125*)*
Problem-oriented	0.63 (1.20)	0.25 (0.65)	-2.171*
Nonverbal	1.25 (1.91)	0.68 (1.28)	-1.963
Neutral	20.42 (7.82)	16.14 (6.30)	-3.398*
Emotion-oriented	3.91 (3.14)	2.52 (2.41)	-2.780*
Dyadic Coping	*M (SD)*	*M (SD)*	*t (df* =125*)*
Problem-oriented	1.66 (2.37)	1.40 (2.09)	0.653
Emotion-oriented	4.17 (3.64)	2.46 (2.81)	2.978*
Negative	1.84 (2.87)	0.94 (2.05)	2.054*

Note. Above the diagonal women's stress conversations (women's stress expression, men's coping) are displayed, below men's stress conversations (men's stress expression, women's coping) are displayed. Means represent the average amount of sequences across the conversation for when the behavior was

coded as 1 (out of 48 sequences). Dyadic coping is displayed by the raw scores and not the combined variable.
*p < .05, **p < .01

Table 2

Generalized Linear Mixed Model: Problem-Oriented DC as a Function of the Four Different Stress Expressions.

			CI_{95} for Estimate			
Fixed effects (intercepts, slopes)	Estimate	(SE)	Lower	Upper	p	OR
Intercept	-3.780	0.247	-4.265	-3.296	<.001	0.02
Sequence	0.005	0.005	-0.005	0.015	.349	1.00
Gender	-0.415	0.254	-0.914	0.083	.103	0.66
Partners‘ Stress expression						
Level-1 (within-couple)						
Problem-oriented	**4.788**	**0.431**	**3.944**	**5.631**	**<.001**	**120.00**
Nonverbal	**1.145**	**0.345**	**0.469**	**1.822**	**<.001**	**3.14**
Neutral	**0.650**	**0.166**	**0.326**	**0.975**	**<.001**	**1.92**
Emotion-oriented	**0.808**	**0.247**	**0.324**	**1.291**	**.001**	**2.24**
Level-2 (between-couple)						
Problem-oriented	**21.645**	**5.439**	**10.984**	**32.306**	**<.001**	**$2.5*10^9$**
Nonverbal	-2.154	3.778	-9.558	5.251	.569	0.16
Neutral	**3.011**	**0.886**	**1.274**	**4.747**	**.001**	**20.03**
Emotion-oriented	0.780	2.146	-3.426	4.985	.716	2.18
Random effects	Variance					
Intercept	1.031					
R^2 (%)	50.53					

Note. N = 127, 48 sequences (6096 observations). SE, standard errors; CI_{95} for Estimate, 95% confidence interval; OR = Odd’s ratio. Gender is dummy coded with 0 = women's coping behavior and 1 = men's coping behavior. R^2 represents the proportional reduction in the variance of the intercepts and is computed based on recommendations of Raudenbush and Bryk (2002) $R^2 = (\hat{\tau}_{00b} - \hat{\tau}_{00f})/\hat{\tau}_{00b}$, where $\hat{\tau}_{00b}$ = the estimated variance of the intercepts in the base model and $\hat{\tau}_{00f}$ = the estimated variance of the intercepts in the fitted model.

Table 3

Generalized Linear Mixed Model: Emotion-Oriented DC as a Function of the Four Different Stress Expressions.

			CI_{95} for Estimate			
Fixed effects (intercepts, slopes)	Estimate	(SE)	Lower	Upper	*p*	OR
Intercept	-3.309	0.189	-3.679	-2.938	<.001	0.04
Sequence	-0.004	0.003	-0.011	0.003	.263	1.00
Gender	0.308	0.196	-0.077	0.693	.117	1.36
Partners‘ Stress expression						
Level-1 (within-couple)						
Problem-oriented	0.418	0.546	-0.651	1.488	.443	1.52
Nonverbal	**1.823**	**0.249**	**1.336**	**2.313**	**<.001**	**6.20**
Neutral	**1.493**	**0.120**	**1.257**	**1.729**	**<.001**	**4.45**
Emotion-oriented	**1.926**	**0.160**	**1.613**	**2.240**	**<.001**	**6.86**
Level-2 (between-couple)						
Problem-oriented	-5.472	4.650	-14.586	3.642	.239	0.00
Nonverbal	1.135	2.779	-4.352	6.621	.685	3.11
Neutral	**1.816**	**0.658**	**0.526**	**3.106**	**.006**	**6.15**
Emotion-oriented	3.062	1.629	0.131	6.254	.060	21.36
Random effects	Variance					
Intercept	0.760					
R^2 (%)	39.32					

Note. N = 127, 48 sequences (6096 observations). SE, standard errors; CI_{95} for Estimate, 95% confidence interval; OR = Odd’s ratio. Gender is dummy coded with 0 = women's coping behavior and 1 = men's coping behavior. R^2 represents the proportional reduction in the variance of the intercepts and is computed based on recommendations of Raudenbush and Bryk (2002) $R^2 = (\hat{\tau}_{00b} - \hat{\tau}_{00f})/\hat{\tau}_{00b}$, where $\hat{\tau}_{00b}$ = the estimated variance of the intercepts in the base model and $\hat{\tau}_{00f}$ = the estimated variance of the intercepts in the fitted model.

Table 4

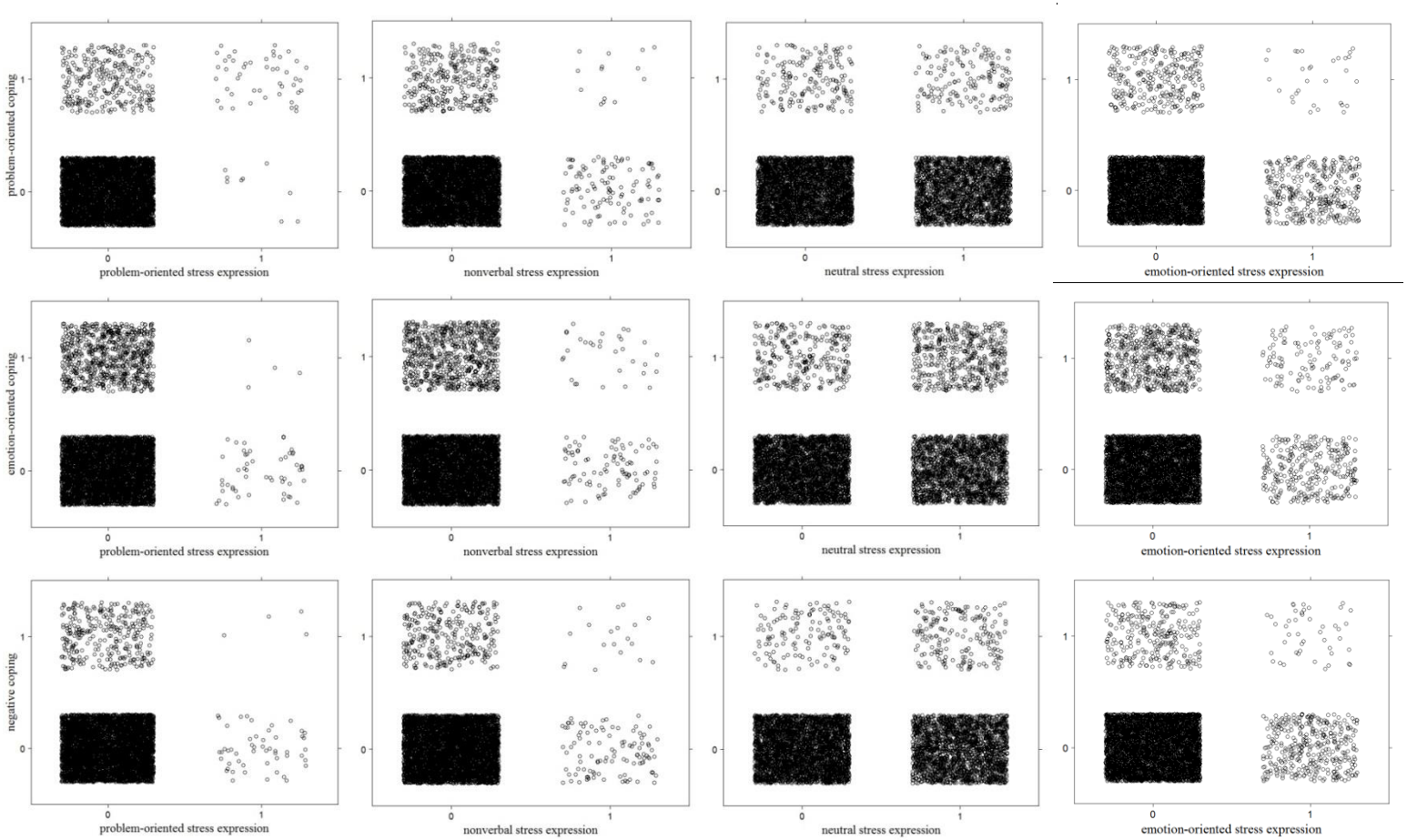
Generalized Linear Mixed Model: Negative DC as a Function of the Four Different Stress Expressions.

			CI_{95} for Estimate			
Fixed effects (intercepts, slopes)	Estimate	(SE)	Lower	Upper	*p*	OR
Intercept	-5.442	0.420	-6.266	-4.618	<.001	0.00
Sequence	-0.001	0.005	-0.012	0.009	.780	1.00
Gender	0.687	0.524	-0.340	1.714	.190	1.99
Partners‘ Stress expression						
Level-1 (within-couple)						
Problem-oriented	1.023	0.583	-0.120	2.166	.079	2.78
Nonverbal	**1.531**	**0.328**	**0.888**	**2.174**	**<.001**	**4.62**
Neutral	**1.481**	**0.178**	**1.133**	**1.829**	**<.001**	**4.40**
Emotion-oriented	**1.599**	**0.238**	**1.132**	**2.065**	**<.001**	**4.95**
Level-2 (between-couple)						
Problem-oriented	2.023	12.304	-22.092	26.138	.869	7.56
Nonverbal	11.883	7.171	-2.173	25.938	.098	145000.00
Neutral	-2.024	1.770	-5.493	1.444	.253	0.13
Emotion-oriented	2.724	4.398	-5.897	11.344	.536	15.20
Random effects	Variance					
Intercept	5.107					
R^2 (%)	14.36					

Note. N = 127, 48 sequences (6096 observations). SE, standard errors; CI_{95} for Estimate, 95% confidence interval; OR = Odd’s ratio. Gender is dummy coded with 0 = women's coping behavior and 1 = men's coping behavior. R^2 represents the proportional reduction in the variance of the intercepts and is computed based on recommendations of Raudenbush and Bryk (2002) $R^2 = (\hat{\tau}_{00b} - \hat{\tau}_{00f})/\hat{\tau}_{00b}$, where $\hat{\tau}_{00b}$ = the estimated variance of the intercepts in the base model and $\hat{\tau}_{00f}$ = the estimated variance of the intercepts in the fitted model.

Figure 1

Plots Showing the Four Different Response Patterns for Each of the Stress Expressions and DC Reactions.



Note. 6096 observations. 0 = behavior was not coded, 1 = behavior was coded. Results are collapsed across men and women.